Report to the
Engineering Department,
City of Madison, Alabama

on the

Management of Trees in the Construction Area for

Project No. 09-031

Improvement of Downtown Streets and Storm Drainage

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PLEASE NOTE: To understand the observations and recommendations in this report, it is necessary to understand how trees are constructed, and how they function. This subject is addressed in the Biology Appendix, immediately following the body of the report.

Introduction

The dependability of trees can usually be estimated and graded in relative terms, but no tree should be declared "safe." Even with careful external inspection, electronic equipment, and other measures, too little can be determined about a tree's interior and underground features, or about the site and its history.

This report is intended to provide information and guidance about the trees along Main Street in Madison, Alabama – in particular, how they should be managed during and after the renovation planned for the near future. Planners are right to preserve a community's landmark trees as links between its past and its future; but it is unwise to preserve the wrong types of trees, and dangerous to preserve trees known or suspected to be hazardous.

Several conditions are attached to the preservation of trees during development and construction. Preservation should be limited to trees that are healthy and vigorous, with sound structure and no problems that can not be corrected by acceptable maintenance practices. Note that some types of tree-care (such as cables, braces, and guy-wires) must be followed by regular inspection and maintenance so that they will not fail during severe weather, or if decay undermines their attachment points in the tree. Note also that the closer trees are to potential "targets" on the ground – usually human traffic and valuable property – the more stringently safety standards must be applied.

It is important to clearly distinguish onsite trees that <u>are</u> to be preserved from trees that are <u>not</u> to be preserved – essentially a <u>construction zone</u> and a <u>non-construction zone</u>. It is possible, early in the construction process before anything happens to affect the trees, to redesignate trees not originally included for protection; however, before construction begins barriers should be erected around groups of trees and sometimes individual trees, with the understanding that "protected" trees <u>must be protected</u>, and other trees are not expected to survive the construction process.

My recommendations are based on my inspection of the existing trees on the construction site, as identified by the City Engineer. Inspections were made during October 2010, **from the ground, using neither mechanical lifts nor climbing equipment.** If there is doubt about whether a tree should be preserved or removed, the tree should be examined close-up by an experienced arborist using rope-and-saddle or a lift truck.

My inspection goals were:

- to estimate the structural integrity and vigor of the trees, and other relevant factors;
- to make recommendations about the trees' suitability for inclusion in the finished construction; and
- to reinforce the need for tree-care measures for trees preserved during construction.

I. EXISTING TREES

PLEASE NOTE: To understand the observations and recommendations in this report, it is necessary to understand how trees are constructed, and how they function. This subject is addressed in the Biology Appendix, immediately following the body of the report.

Criteria for Saving/Removing Trees In or Near the Construction Zone.

The following are criteria for deciding whether a given tree should be preserved during construction, or removed to make way for hardscape, other plants, or open space. The same sorts of considerations apply to choosing species and individual plants to be planted during the landscaping phase of construction.

1. The tree must be protectable, including both its above-ground and below-ground parts. This is not limited to injuries on the trunk and branches; even more important is protection of the root system during site clearing, changes of grade, and changes in soil texture and density in the interest of its load-bearing capacity.

2. The tree's **mature size** must be appropriate to the other uses of the site.

3. The tree must have good **structure, health, and vigor.**

4. The species should have **strong wood and a moderate growth rate**. Fast growth and "instant shade" almost invariably come at the cost of strength, structure, and durability.

5. The tree must be of a **species adapted to on-site conditions.** This includes regional soil and climate factors, urban conditions (generally much more restrictive than the natural factors), and constraints of the specific site.

6. The species must be reasonably **free from insect and disease problems, messiness,** etc.

7. The tree's **esthetic features** (size, shape, foliage, shade production, flowers, fall color, etc.) must fit the functions and surroundings of the site.

8. The owner of a tree to be preserved (or planted) during construction must have the **means and determination to protect and maintain the tree** before, during, and after construction. This includes timely pruning and watering, and frequently fertilization, to prevent more serious and costly problems later in the tree's life. Occasionally a preserved tree justifies measures such as cabling, though this brings with it a responsibility to inspect and maintain the hardware and installation through the tree's life.

Survey of Existing Trees in the Planned Construction Area

My survey of the existing trees in the construction area included the following data points, as may be seen in the data summaries (Appendix A-5):

- Species
- Trunk diameter (measured approximately 4-1/2' above the ground)
- Number of stems (sometimes noted in the format of "2 / 1" to indicate a single trunk that forks into two major secondary parts). This is an extremely important point, affecting public safety as well as the appearance of the trees.
- Observable problems with roots, base, lower trunk, forks, and branch attachments. This is often closely related to the previous field.
- Distance from the existing curb
- Distance from the proposed new curb (estimated from the engineering drawing)
- Maintenance needs, if the tree is to be retained
- Other comments
- Disposition recommendations and options (added during analysis)

In addition, I took photographs of most of the trees, emphasizing their overall shape and character, and (where possible) showing specific tree parts that affect trees' serviceability and safety. The photographs were taken from ground level, before significant leaf-drop, so many of the problems were impossible to depict clearly. Copies of the photographs are available on request.

My comments and recommendations are based on a cumulative impression of the trees' structure, condition (health, vigor, injuries, decay, etc.), proximity to planned construction, and post-construction serviceability. Consideration was also given to the various species' general desirability for urban plantings.

The trees along Main Street have for many years been important to the ambience of Madison's downtown area. But with few exceptions, despite the hopes of those who planted them, the trees in this area are now failing. This has resulted partly from the difficulty of foreseeing the city's recent expansion, along with other factors:

- Soil compaction, from foot- and machine-traffic, especially along the north side of Main St.
- Conflict with overhead and underground utility lines
- Unfortunate decisions about where and how to plant many of the trees
- A lack of informed maintenance as the trees matured

These factors suggest how existing trees should be managed, and speak clearly to the design of future plantings in this area. Any of the existing trees that are to be retained in the post-construction landscape must receive aggressive protection during construction, and regular, knowledgeable management and maintenance after construction is completed.

General Comments on the Trees along Main Street

The 33 trees consist of:

5 green ash (1 missing)	All remaining ash trees should be removed
3 European beech	All excellent; transplant with tree spade if possible
2 Foster holly	Poor condition; remove; not worth trying to transplant
1 southern magnolia	Remove; might possibly be transplanted with tree spade; if so, remove the lesser of the two stems
1 red maple	Remove; might possibly be transplanted with tree spade; if so, prune out deadwood & thin the crown
17 sugar maple	(See separate comments below.)
1 willow oak	Remove, along with the adjacent sugar maple
1 pecan	Consider leaving in its present location; should receive minor pruning, and probably have 2-3 cables installed; remove object in fork
2 redcedar	Preserve in current locations, if possible

Green Ash makes up about 15% of the trees in this area. The largest one, on the north side near the east end, is in extremely poor condition, with branch- and top-dieback, serious internal decay in the trunk and several branches, and several hazardous forks with included bark (see Biology appendix). It should be removed immediately, regardless of construction plans. Of the other four small green ashes on the south side of the street, one is only a stump where the tree was removed recently; the remaining three are relatively poor specimens, though one might be transplanted to some other site, using a tree spade.

The three **European Beeches** are the finest trees on the street. All are in excellent health, with good structure and an extremely pleasant appearance. Although beech trees are somewhat sensitive to disturbance, and the diameter of these (10-13") is at the upper limit for most tree-spades, it is possible that they might be transplanted to another site this winter. They definitely justify exploring the feasibility, and the possibility of success outweighs the risk of failure. This species should be considered for use in the overall planting design for this area.

The two **Foster Hollies** near the west end of the north side are well inside the construction area. They are meaningless in the landscape, and poor specimens that do not justify the effort or expense of transplanting.

The **Southern Magnolia** near the southwest corner of the Main Street Café is in an unfortunate location – under power lines, too near the building, and very close to the planned construction. Further, it has two stems forming a "V" that is likely to become narrower and weaker as the trunks grow in diameter. If underground utilities and other conditions permit, it might be transplanted to a more appropriate site, using a tree spade. If so, removing the lesser of the trunks would probably do more good than harm in the long run.

Sugar Maples. The key question in this entire situation concerns the sugar maples – 2 on the south side of Main Street, and 15 along the north side. They constitute about half of the overall tree population, and an even larger fraction of the tree canopy. Their average diameter is around 23", which suggests that they should not be senescent at this point in their lives. On the average, each of them contains 1-2 forks with included bark (see explanation in the Biology appendix); some trees have 4-6 of these forks, which often are precursors of failure, usually during violent weather. The sugar maples' overall condition ratings, on a scale of 0 (dead) to 90 (extremely good) are summarized as follows:

(Sugar Maples, cont'd)

Condition	Quantity
90 (excellent)	-
80	**1**
70	-
60	**1**
50	**3**
40	**4**
30	**7**
20	**1**
10	-
0 (dead)	-

Clearly, these trees are nowhere near as serviceable as they could have been under better circumstances, and about half of them actively threaten public safety. The one across from the Main Street Café has two V-shaped forks; one low in the west side of the crown is especially dangerous, with a serious bark inclusion that has already begun to fail, and showing a deepening crack that is already over a foot long. Because of these defects, the entire tree should be removed immediately. (See also the comments on Willow Oak, below.)

Removing such a large fraction of the historic trees in Madison's downtown area – particularly all at once – is unlikely to be received calmly and thoughtfully by the public. Recognizing that many people value the apparent character of a tree more than its safety (at least until it fails and injures people and property below), one approach might be a phased landscape design, removing and replacing the most unreliable trees first, and others as the replacement trees mature. This might be technically more difficult than doing all the removals and replanting at once, but in the long run it might be easier, and it could have the advantage of creating a vegetation community with increased age diversity.

There is also the question of Tree #4, the sugar maple in the outdoor dining area of the Main Street Café, which is not included in the street renovation plans, according to the Engineering Department. Observation from the deck under this tree revealed several included-bark forks and potentially hazardous decay low in the crown. However, the ownership and maintenance responsibility status of this tree are not clear to me, nor is its relationship to the street renovation project or to the other trees in this area.

I recommend a close-up climbing inspection of this tree to determine what maintenance is needed, a determination of maintenance responsibility, and expeditious action to do whatever is needed.

The **Willow Oak** across from the east end of the Main Street Café, and paired with the worst of the Sugar Maples, presents another removal situation that must be resolved in terms of public safety. It has:

- roots extended over the curb
- basal damage on three sides
- a low branch over the adjacent parking space, struck by vehicles from time to time
- trunk decay on the south and west sides, from the ground up into the crown
- deadwood over adjacent buildings, and
- deadwood and dieback high in the crown.

If there is any thought of retaining this tree, it should be inspected, close-up, using an aerial lift truck. This is the largest tree on the street, but potentially the most dangerous; I believe that when the tree is removed, its interior will reveal more serious problems that a street-level observer cannot possibly see.

A 2-stem **Pecan** grows on the north side of the street near the west end, in a greenspace area where evidently no construction is anticipated. Its one significant fault is a V-shaped fork near the base; however, properly installed and maintained cables, plus a little minor deadwood removal, should be able to make this a serviceable and attractive tree. Note that there is what looks like a rock, or possibly an iron window-sash weight, embedded in the fork; this could seriously damage a chain saw, and might cause personal injury, whether the tree is removed soon or in the distant future. It should be removed as soon as possible.

Two **Eastern Redcedar** trees grow, one on each side of the west end of Main Street. Both, 15-20" in diameter, are in very good condition; the one on the north side is slightly flat-sided from Utility clearance trimming. These trees have good form and structure, and few injuries; if they can be included in the overall landscape design, they should be protected during construction, and maintained subsequently.

Protection Measures for Trees to be Saved in or near Construction Areas

TOPICS
Protection of trees in and near the construction zone
Triage
Work in the root zone of trees to be preserved
Growth regulators
Pruning
Treatment of trunk and branch wounds
Removal of stumps of removed trees when there are other trees nearby
Education of construction personnel

Protection of trees in and near the construction zone. An effective approach to tree protection is to divide the construction area into two distinct zones:

- Tree Protection Zone – fenced zones that include all trees to be preserved, preferably in groups; and

- Construction Zone – no construction-related activity may take place without the owner's understanding and consent.

Early in the construction process, before anything happens to affect the trees, all parties may agree that some trees not originally included for protection may be reassigned into a protection zone. However, preservation should not include:

- trees that cannot be protected from above- and below-ground damage during construction;

- trees that, from neglect or unsound tree-care practices, have developed structural faults that cannot be corrected by proper pruning and/or other measures;

- trees that cannot receive proper continuing maintenance after the completion of construction; or

- trees that are of species known to be incompatible with the uses of the area around them; some important considerations are mature size; resistance to disease, decay, and insect attack; and freedom from excessively messy fruit, flowers, leaves, etc. Appendix A-4 includes a list of trees with characteristics that generally make them unsuitable for urban areas.

Before construction activity begins, barriers should be erected around all protection zones, with the understanding that "protected" trees will be protected, and other trees are not expected to survive the construction process.

The barriers must be sufficient to keep out all unauthorized activity, including vehicle- and foot-traffic, equipment operation, parking of cars and equipment, storage of materials, use of fire, dumping of refuse, equipment wash-down, etc. Fencing around individual trees should be done with a material at least as durable as plastic construction fence, with the ends overlapped enough to discourage traffic, but far enough apart to permit entry for specific legitimate purposes.

Further, any action not specified in construction plans, that could result in abnormal drainage or accumulation of water must also be avoided.

Triage. At times, construction needs force a choice between (a) damaging two or more trees, more or less equally, or (b) sacrificing poorer trees in favor of better trees. Such decisions are best made by the owner, in consultation with the engineer in charge, the construction superintendent, and an arborist.

Work in the root zone of trees to be preserved.

- There should be no construction activity, other than possibly augering under the root system, in any tree's root-plate area (see below).
- Avoid tearing roots over 1" diameter with power equipment such as back hoes, trenchers, etc.
- Make all final root cuts cleanly, preferably using appropriate sharp tools, such as pruning shears, loppers, or a manual pruning saw.
- Dig from within trench lines.
- Pile soil away from the root zones of trees to be preserved.
- Where trenching is necessary, stay outside the overall root zones of trees to be preserved. Where this is not possible, keep the trench toward the perimeter of the overall root zone – and never across a tree's root-plate area. In extreme situations, it is sometimes possible to trench inward radially from each side, stopping outside the edge of a tree's root-plate area (about a foot off-center), then connect the trenches by augering under the root plate at a depth of at least 2-2½ feet.
- Specific trees at risk should be mulched using wood chips to a depth of 2-3", and watered as needed to keep the soil moist.

Growth regulators such as Paclobutrazol (See Appendix A-3) may be considered for use where the welfare of specific trees near construction activities is at risk.

Pruning. Trees to be retained should receive pruning to eliminate deadwood and branches that are damaged, crossed and rubbing, overextended, or otherwise undesirable. Additional pruning, wound care, and other measures are likely to be needed, particularly if protective measures are neglected or defeated during the construction process.

All pruning of live and dead branches is to be done in accordance with ANSI Standard A300. While proper pruning procedures are generally not complicated, there are distinct "right" and "wrong" ways of doing most work (see Appendix A-2 for a general explanation). These procedures, and the ANSI standard specifying them, should be included in the education process described above. This topic must also be included in instructions to any commercial arborist retained to remove or prune trees on the construction site.

Treatment of trunk and branch wounds. Trunk and branch wounds are to be avoided by keeping equipment and activities as far as possible from trees' root zones. Existing or future accidental injuries are to be treated by "bark-tracing" with a sharp knife and/or chisel and mallet, to accomplish the following:

- remove torn or loose bark around the wound
- insure that the uppermost and lowest ends of the tracing are rounded, not pointed.

It is especially important to keep wounded trees well watered and healthy.

Removal of stumps of removed trees when there are other trees nearby. Such stumps should be ground out, rather than pushed out, to minimize damage to intertwined roots of neighboring trees that are to be retained.

Education of construction personnel. I strongly recommend a brief, to-the-point, presentation for supervisors, foremen, machine operators, and other construction workers, to include:

- Keeping construction activities away from trees' root zones
- Keeping traffic and materials away from all trees
- Treatment of damaged roots, trunks, and branches
- Pruning of branches
- Purposes and application of mulch
- Other topics as appropriate

A Suggestion about the Basic Construction Design

One fundamental rule of preserving a tree on a construction site is to avoid any disturbance of its root-plate area – the "zone of rapid root taper" immediately around the base of each tree (see Appendix A-1 for details). In this area any disturbance is likely to affect not only the tree's health, but also its stability. For the sugar maples along Main Street, the radius of this zone is about 10'.

Current plans for perpendicular parking would apparently place the new curb 10' to 20' to the north of the existing curb. All of the existing sugar maples are less than 10' from the expected location of the new curb line, so the root plate of every sugar maple on that side of the street would be disturbed. Further, 1/3 to 1/2 of the feeder and transport roots of each of these trees would be removed during preparations for paving.

During my inspection of these trees, a number of people asked me what I was doing. I explained briefly, and without exception their reaction was something like "Perpendicular parking? Why don't they put in diagonal spaces?" This caused me to wonder if that change would be more destructive to the trees.

Diagonal parking would require somewhat more space than perpendicular parking – the diagonal of a 10'x20' rectangle is somewhat over 22'. So this would increase the depth of the parking spaces from 20' to about 23'; and all of the increase from both sides of the street would have to be added on the north side of the street, because of property ownership limitations. But this would really not increase the number of trees seriously affected, since even perpendicular parking would disturb the root plates of all of the trees.

I believe it is likely that in the long run, this option could contribute much more than it detracts. About 7 of the existing trees already need to be removed from the north side of the street for public safety, because of weak forks, internal decay, and other defects. Another 4 trees would need to be removed because the entire south half of their root

systems would be cut off. And of the remaining 4 trees in this area, only one had a condition rating over 50%.

As painful as it would be to see so many trees come down at once, in the end, I believe this option might create not only better parking conditions, but also opportunities for a planting design that is much more creative, useful, durable, and manageable, with fewer complications related to grade changes. A design unencumbered by the existing marginal sugar maples would allow planting of various kinds of trees, along with shrubs, flowers, and ground covers, in traffic- and mower-free mulched beds, which could be irrigated and managed separately from grass areas.

On the south side of the street, the 20’ x 20’ areas planned for trees are too small for major trees (see Jim Urban’s soil-volume table in the Biology Appendix). But they could easily support small- to medium-sized trees, along with shrubs and ground covers. Larger trees might better be planted on adjacent owners’ property, about 20’ back from the new sidewalk, if property owners will accept ownership and maintenance responsibility for the new trees. This is an option specifically permitted in Huntsville’s tree ordinance.

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- Planting techniques

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- Tree Inspection Data Summary (including notes on problems, maintenance needs where trees are to be retained, and other comments)

Essential Tree Biology

Good tree-management decisions require at least a general understanding of how trees grow, and what they need to grow well. The selection of tree species and individual plants to be installed during landscaping, the planting process, pruning and other maintenance all depend on this understanding.

Of necessity, my explanations below are generalized and over-simplified. Many details are contrary to most people's beliefs and assumptions, which is not surprising, since few persons have studied trees' interior parts, and even fewer have seen the entire root system of a tree.

I. Tree Roots – Requirements for Growth. The processes that make construction-site soils suitable to support buildings and pavements are almost exactly contrary to the needs of trees and other plants. So in landscaped areas, specific measures must be taken to re-create a soil environment where plants can prosper.

Most people understand that plants require considerable quantities of minerals and other **nutrients** in the soil – nitrogen, phosphorus, and potassium, plus "micronutrients" that must be present in much smaller quantities. Soils on construction sites and in other urban places are frequently deficient in many of these nutrients; further, some nutrients are easily leached from the soil. So in landscaped areas, part of the construction process must include restoring soil fertility, usually with imported topsoil, commercial fertilizers, organic (plant- and animal-based) materials, and mulch.

A second major requirement of plants is **water** – enough, but not too much – as a medium for the distribution of nutrients, sugar (plants' energy source) produced by the leaves, growth regulators, waste products, and other materials. Water must be present in the spaces between soil particles. It is required throughout the year, not just during the growing season.

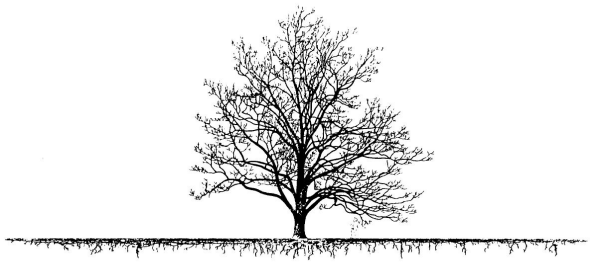
Less widely understood, there must also be **oxygen** in the spaces between soil particles. Just as plants' leaves require carbon dioxide and light in order to produce sugar and other materials, roots require **oxygen** to combine with and break down sugar, to release its energy for growth, to repair injuries, and to react to attacks by insects, fungi, and other pathogens.

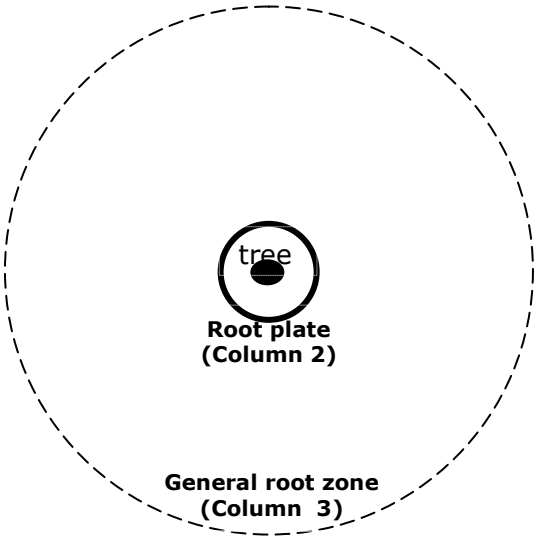
Clearly, to fill plants' needs, soil must be a complex blend of minerals in various particle sizes, some small enough to attract and hold water and nutrients, but also particles large enough to create spaces that permit water and oxygen to move through it, and permit plant roots to grow through it.

II. Distance to Minimize Tree Damage During Construction. Any disturbance of a tree's roots affects the uptake and transport of water and nutrients from the soil to the trunk and crown of the tree, provides access to the interior of the tree by disease and decay organisms (usually fungi), and can seriously affect the stability of the tree.

Most people, including many who should know better, believe that the root system of a tree consists of a long, deep, tapering tap root with side branches forming more or less a mirror image of the top.

Probably the people with the best understanding of trees' root systems are bulldozer operators, plus a few biologists. They know that the profile of a tree is more like that of a brandy snifter on a tray. The root zone consists of two parts, the root plate immediately around the base of the trunk, and the general root zone, which extends outward, usually





well past the tips of the branches. Often a tree shares its root zone with other trees, with shrubs and ground-level vegetation, and with an untold number of animals, insects, worms, and other creatures – some of which may be beneficial, and some not.

Research has provided some hints about the depth and width of a tree's root zone. Column 2 in the chart below gives the approximate radius of the "root-plate" (or "zone of rapid root taper") for trees of various sizes. Within this area, roots branch outward from the base of the trunk, tapering rapidly from a significant fraction of the trunk diameter down to a few inches or less. This zone is especially critical to the stability of the tree.

Tree Diameter (inches)	Root Plate Radius (ft.)	Overall Root Zone Radius (ft.)
12″	7	15
18″	8	23
24″	10	30
30″	10	38
36″	10	45
40″	11	50
45″	11	56
50″	12	63

Column 3 shows the approximate overall root-zone radius of trees of various sizes. Root damage from encroachment on this area during construction affects the tree's ability to extract water and nutrients from the soil, and can also affect the health and stability of the tree.

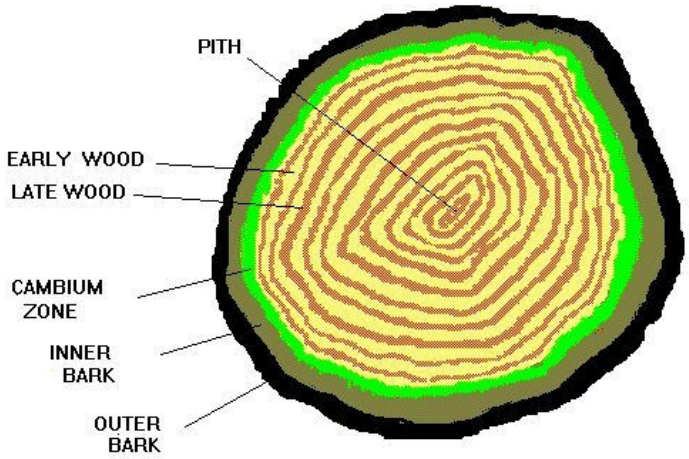
All activities – site clearing, movement and parking of vehicles, storage of building materials, trenching, human traffic, etc. – should be kept as far as possible from a tree to be preserved on a construction site – absolutely out of its root-plate area, and preferably outside as much as possible of the general root zone.

Rooting Area & Radius Requirements for Trees. How much soil does a tree need? Landscape architect Jim Urban, of Annapolis, Maryland, accumulated and generalized

research by many authors, showing that <u>on the average a tree needs about 60 cubic feet of usable soil per inch of its *mature* trunk diameter</u>. The last column of the table below shows the radius of a circular area that would contain that amount of soil, assuming a <u>usable soil depth of 18", which is usually about the downward limit of root growth in North Alabama</u>; the radius would be considerably larger for soils with less useful depth. **This should be kept in mind in planting designs.**

Mature Tree Diameter	x 60 cu.ft. soil per inch of mature trunk diameter	÷ 1.5 ft. soil depth = sq.ft. soil **surface area**	÷ Pi (3.14159) = squared radius of circular area	√ (sq.root) = **<u>radius</u> of circular area**
12"	720 cu.ft.	480 sq.ft.	152.8	**12.4 ft.**
18"	1080 cu.ft.	720 sq.ft.	229.2	**15.1 ft.**
24"	1440 cu.ft.	960 sq.ft.	305.6	**17.5 ft.**
30"	1800 cu.ft.	1200 sq.ft.	382.0	**19.5 ft.**
36"	2160 cu.ft.	1440 sq.ft.	458.4	**21.4 ft.**
42"	2520 cu.ft.	1680 sq.ft.	534.8	**23.1 ft.**
48"	2880 cu.ft.	1920 sq.ft.	611.0	**24.7 ft.**

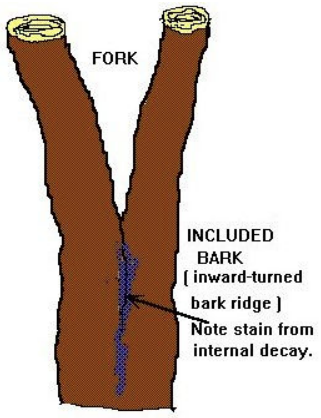
Tree Structure: Internal parts and growth locations. It is important to know that tree growth takes place by means of groups of cells that can replicate themselves (*meristem*) in two locations. Trunks, branches, twigs, and roots grow in <u>length</u> by means of the *buds* at their tips. But they grow in <u>diameter</u> by means of the *cambium zone* just under the bark in all living parts of the tree.

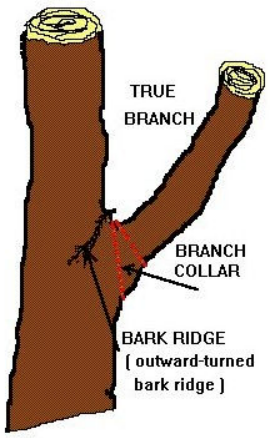


Cells in the cambium zone reproduce by dividing, laying down new wood cells on top of those already in place, and new inner bark cells on the inside of those already in place. In this way new protective cells are formed from the inside of the tree, while new layers of wood are added to the outside of the existing wood.

The cambium zone enables a tree to add new layers of wood onto those already in place, to expand its outer "skin" to cover an expanding interior volume, and to respond to injuries. However, when part of the cambium is destroyed, the tree loses protection in that area, and the resulting problems can spread to other parts of the tree. The next section explains how this can severely affect the safety of trees, with serious consequences for people and property below.

Tree Structure: Forks and branches. Tree crowns grow in two general ways – with true branches, and with forks.





A true branch has three identifying features:

- an upward-turned bark ridge above the branch attachment;
- a somewhat swollen "collar" at the base of the branch; and
- a protection zone laced with natural decay inhibitors, in the collar.

When a branch is pruned off outside the collar, little or no decay can spread into the remaining cut face; the natural protection zone actually does what pruning paint is meant to do. And all of the bark is visible in the angle of a well-attached branch.

A fork has none of these features.

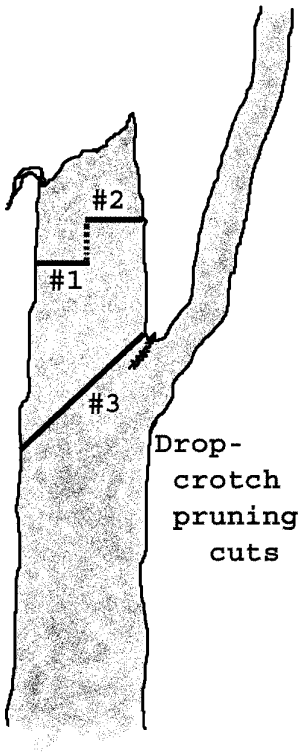
- Instead of a bark ridge, bark from each side disappears down into the fork, extending an indefinite distance into the tree below.
- There is no collar at the base of either side of the fork; so…
- There is no protection zone, and no way to prevent the spread of decay into the exposed part of the trunk below.

As mentioned above, one of the most serious tree hazards is a V-shaped fork, also referred to as an "included-bark fork," and noted as "IBF" in my tree-inspection data. The more the

arms of the fork grow in diameter, the more pressure increases on the cambium under the bark on each side within the fork, often killing the cambium cells, leaving the interior of the tree unprotected, and increasing the likelihood that the fork will fail.

U-shaped forks with no included bark generally present much less risk of failure than V-shaped forks.

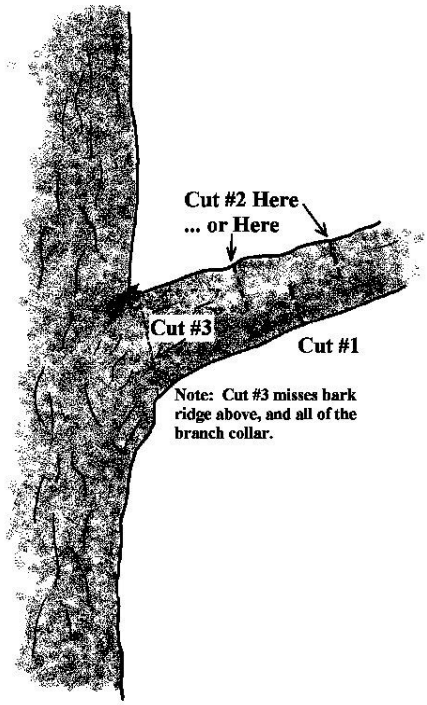
Pruning techniques and their effects on the safety of trees. Every pruning cut is a tree injury. The objective of good pruning is to provide the most improvement of a tree's health, vigor, and safety, at the least cost in terms of injury. The basic technique is to understand and work with the tree's natural, built-in protections.



The most common pruning cut is referred to a "drop-crotch" cut, used to reduce the height of a trunk or the length of a branch. After reducing the part being cut off to a manageable size and weight, the final cut is made just above or outside a lateral branch growing in an acceptable direction.

This cut is made so as to remove wood (between cuts #1 and #3 in the illustration on the left) that would rot away because it has no leaf canopy attached above it to feed it and keep it alive. The final cut is made so as to avoid tearing bark on the remaining part of the tree.

At least as important is the cut used to remove a damaged or unwanted branch. The principle is the same, but this cut has the advantage of a natural protection zone to keep decay from entering the remaining part of the tree. Once the bulk of the branch is removed, the final cut is made just outside the branch collar, without cutting into either the bark ridge or the collar.



In the past, many tree workers intentionally made "flush-cuts," thinking that they were more workmanlike; however, these usually had about twice the area of the "collar cut", and removed the natural protection zone. This almost always leads to a large pocket of decay extending down into the heart of the tree – good shelter for birds and squirrels, but very harmful to the tree.

Growth Regulators, such as Paclobutrazol, are sometimes used to fortify trees on construction sits against various problems. The following paragraphs from Wikipedia explain the general principles:

Paclobutrazol, **PBZ** (chemical name (2RS, 3RS)-1-(4-Chlorophenyl)-4,4-dimethyl-2-(1H-1,2,4-triazol-1-yl)pentan-3-ol) is a plant growth retardant and triazole fungicide. It is a known opponent of the plant hormone gibberellin. It acts by inhibiting gibberellin biosynthesis, reducing internodal growth to give stouter stems, increasing root growth, causing early fruitset and increasing seedset in plants such as tomato [1] and pepper.[2] PBZ has also been shown to reduce frost sensitivity in plants. PBZ is used by arborists to reduce shoot growth and has been shown to have additional positive effects on trees and shrubs. Among those are improved resistance to drought stress, darker green leaves, higher resistance against fungi and bacteria, and enhanced development of roots. [3] Cambial growth as well as shoot growth has been shown to be reduced in some tree species.[4]

Application methods

PBZ is normally applied to the soil to be taken up by the roots and transported via the xylem to the upper parts of the plant. Foliar application is mostly ineffective.[5] Seeds can be soaked with PBZ to reduce seedling growth.[6] PBZ is the active component of Bonzi TM with 4g/l.

Planting Replacement and Supplementary Trees

In general, the considerations that apply to preservation of existing trees also apply to the planting of replacement and supplementary trees.

1. The trees must be **protectable**.
2. The tree's **mature size** must be appropriate to the planting space. In commercial areas this can involve pedestrian access and visibility of storefronts and signage.
3. The tree must have good **structure, health,** and **vigor.**
4. The species should have **strong wood** and a **moderate growth rate**.
5. The tree must be of a **species adapted to local site conditions.**
6. The species should be free from serious **insect and disease problems, messiness,** etc.
7. The species should have good **esthetic features** (size, shape, foliage, shade production, flowers, fall color, etc.).
8. The owner must have the **means and determination to protect and maintain the tree**.

Native and exotic species. Some residents resist the planting of non-native species. However, there is no accepted rule about what constitutes an exotic species – some are more obvious than others. I favor a policy of using species with a well-established history of being non-invasive as well as durable, attractive, functional, and tolerant of urban conditions.

The tables on the following pages list many acceptable tree species, in four mature-size classes, listing their most prominent characteristics. A fifth table lists species known to have undesirable characteristics that limit their desirability, especially in urban environments.

Shrubs / Small Trees 6-15' tall. **General selection criteria:** USDA hardiness zone 7 (N. Ala. – N. Tenn.); typically single-trunk (unless specified otherwise); branches & trunk of larger species resistant to breakage; surface rooting generally not a problem; no thorns; minimal problems with messiness; little invasive potential

LATIN NAME	COMMON NAME	NOTABLE VARIETIES, COMMENTS	LEAF SHED	MIN PLTG SPACE WIDTH
Acer palmatum	Japanese Maple (Usually multi-trunk.)	'Bloodgood,'Burgundy Lace,' 'Dissectum,' 'Atropurpureum,' 'Ornatum,' and many others of various size, shapes, and colors.	Deciduous	8'
Cotinus coggygria & C. obovatus	European and American Smoketree. (Usually multi-trunk. Can be trained to 1 trunk.)	Many varieties. European species may be green or purple; American species has bluish medium-green leaves. Flowers are filamentous, like ostrich feathers with small suspended seeds.	Deciduous	8'
Hibiscus syriacus	Rose-of-Sharon, Althea	Many varieties. Flowers single or double, white, cream, gray, red, pink, blue, lavender.	Deciduous	4'
Ilex decidua	Possumhaw (deciduous holly). (Usually multi-trunk. Can be trained to 1 trunk.)	'Byers Golden,' 'Council Fire,' 'Hunter,' and many others.	Deciduous. Winter berries	8'
Lagerstroemia indica	Crapemyrtle. (Usually multi-trunk. Can be trained to 1 trunk.)	Dozens of varieties, including 'Natchez,' 'Potomac,' 'Yuma,' 'Acoma,' 'Cherokee,' 'Comanche,' 'Osage,' 'Sioux,' etc. **Select variety first for size and shape, hardiness, and disease resistance**; then choose flower color, blooming season, fall foliage, and bark display. **Do not top crapemyrtles !**	Deciduous, but has interesting bark and persistent fruit hulls.	4' for upright varieties. 8' for spreading varieties.
Magnolia x soulangiana	Saucer magnolia. (Usually multi-trunk.)	'Lilliputian,' 'Verbanica.' Very early large purple flowers. Vulnerable to late spring frost.	Deciduous	8'
Malus sargentii	Sargent crabapple. (Usually multi-trunk. Can be trained to 1	Many varieties, including 'David,' 'Jewelberry,''Mary Potter,' 'Prairifire,'	Deciduous	6' →

Shrubs / Small Trees 6-15' tall. **General selection criteria:** USDA hardiness zone 7 (N. Ala. – N. Tenn.); typically single-trunk (unless specified otherwise); branches & trunk of larger species resistant to breakage; surface rooting generally not a problem; no thorns; minimal problems with messiness; little invasive potential

LATIN NAME	COMMON NAME	NOTABLE VARIETIES, COMMENTS	LEAF SHED	MIN PLTG SPACE WIDTH
	trunk.)	'Profusion,' 'Red Jade,' 'Red Jewel,' etc.		
Vaccinium arboreum	Sparkleberry, Tree Huckleberry. (Usually multi-trunk.)		Deciduous	6'
Viburnum obovatum	Blackhaw, Walter Viburnum. (Usually multi-trunk. Can be trained to 1 trunk.)		Semi-evergreen	6'
Viburnum plicatum var. tomentosum	Doublefile Viburnum. (Usually multi-trunk. Can be trained to 1 trunk.)		Deciduous	6'
Vitex agnus-castus	Chastetree, Vitex	'Alba,' 'Rosea,' 'Silver Spire'	Deciduous	4'

Trees 15-25' tall. **General selection criteria:** USDA hardiness zone 7 (N Ala - N Tenn); typically single-trunk (unless specified otherwise); branches & trunk of larger species resistant to breakage; surface rooting generally not a problem; no thorns; minimal problems with messiness; little invasive potential.

LATIN NAME	COMMON NAME	NOTABLE VARIETIES, COMMENTS	LEAF SHED	MIN PLTG SPACE WIDTH
Aesculus pavia	Red Buckeye	Small native tree with beautiful flowers.	Deciduous	6'
Chionanthus virginicus	Fringetree, Old-Man's Beard, Grancy Graybeard	Beautiful white spidery flowers in spring; grows native in NE Ala woods. **Supplier may be hard to locate**.	Deciduous	6'
Crataegus aestivalis	May Hawthorn, Apple Hawthorn		Deciduous	6'
Ilex x attenuata 'Fosteri'	Foster Holly	Can exceed 25' in height over a long period.	Deciduous	8'
Koelreuteria bipinnata	Chinese Flame-tree	Non-native; may look out-of-place in some environments, but can be very serviceable.	Deciduous	8'
Koelreuteria paniculata	Goldenraintree	Non-native; may look out-of-place in some environments, but can be very serviceable.	Deciduous	8'
Laburnum spp.	Goldenchain Tree	Non-native; may look out-of-place in some environments, but can be very serviceable.	Deciduous	8'
Magnolia grandiflora — dwarf forms	Southern Magnolia — dwarf forms	'Glen St. Mary.' 'Jane' is a dwarf form.	Evergreen	6'
Malus baccata, M. callocarpa, M. floribunda M. hupehensis M. sargentii	Flowering crabapple	Many varieties of each species, with much diversity of size, shape, flower color, etc. Crabapples require periodic pruning, but can produce excellent effects in the landscape.		6'
Prunus caroliniana	Carolina laurelcherry	Often a shrub, but can be pruned into an elegant small evergreen tree.	Evergreen	6'
Prunus cerasifera	Pissard (Purple-leaf) Plum, or Cherry Plum	'Atropurpurea,' 'Krauter Vesuvius,' 'Mount St. Helens,' 'Newport,' 'Thundercloud'	Deciduous	6'

→

Trees 15-25' tall. **General selection criteria:** USDA hardiness zone 7 (N Ala - N Tenn); typically single-trunk (unless specified otherwise); branches & trunk of larger species resistant to breakage; surface rooting generally not a problem; no thorns; minimal problems with messiness; little invasive potential.

LATIN NAME	COMMON NAME	NOTABLE VARIETIES, COMMENTS	LEAF SHED	MIN PLTG SPACE WIDTH
Prunus serrulata 'Kwanzan'	Kwanzan Flowering Cherry		Deciduous	6'
Prunus x yedoensis	Yoshino Cherry		Deciduous	6'

Trees 25-50' tall. General selection criteria: USDA hardiness zone 7 (N Ala - N Tenn); typically single-trunk (unless specified otherwise); branches & trunk of larger species resistant to breakage; surface rooting generally not a problem; no thorns; minimal problems with messiness; little invasive potential.

LATIN NAME	COMMON NAME	NOTABLE VARIETIES, COMMENTS	LEAF SHED	MIN PLTG SPACE WIDTH
Acer barbatum	Florida Maple, or Southern Sugar Maple		Deciduous	8'
Acer buergeranum	Trident Maple		Deciduous	6'
Acer campestre	Hedge Maple	'Evelyn,' 'Postelense,'	Deciduous	8'
Acer rubrum	Red Maple	'Armstrong' (strongly upright), 'Autumn Flame,' 'Bowhall,' 'Gerling,' 'October Glory,' 'Red Sunset'	Deciduous	8'
Acer saccharum	Sugar Maple	'Endowment,' 'Goldspire, ''Newton Sentry,' 'Temple's Upright'	Deciduous	8'
Betula nigra	River Birch	'Heritage'	Deciduous	8'
Carpinus betulus	European Hornbeam	'Fastigiata,'	Deciduous	4'
Carpinus caroliniana	American Hornbeam		Deciduous	4'
x Cupressocyparis leylandii	Leyland Cypress	'Haggerston Gray,' 'Naylor,' s Blue,' 'Silver Dust,'	Evergreen	8'
Cryptomeria japinica	Japanese Cedar, Cryptomeria	'Elegans,' 'Yoshino'	Evergreen	6'
Gleditsia triacanthos v. inermis	Honeylocust (thornless)	Create light shade; use only thornless varieties, and preferably non-fruiting varieties. 'Imperial' and 'Sunburst' varieties grow to 30-45' in height.	Deciduous	8'
Gordonia lasianthus	Loblolly-Bay	'Variegata'	Deciduous	6'
Halesia	Carolina Silverbell	'Rosea'	Deciduous	6' →

Trees 25-50' tall. General selection criteria: USDA hardiness zone 7 (N Ala - N Tenn); typically single-trunk (unless specified otherwise); branches & trunk of larger species resistant to breakage; surface rooting generally not a problem; no thorns; minimal problems with messiness; little invasive potential.

LATIN NAME	COMMON NAME	NOTABLE VARIETIES, COMMENTS	LEAF SHED	MIN PLTG SPACE WIDTH
carolina				
Halesia monticola	Mountain Silverbell	'Rosea'	Deciduous	6'
Ilex cassine	Dahoon Holly	'Angustifolia'	Evergreen	6'
Ilex glabra	American Holly	'Callaway,' 'Greenleaf,' 'Howard,' 'Lady Alice,' ' Old Gold,' 'Slim Jim,' 'Stweart's Silver Crown,' 'Westcroft,' 'Yellow Jacket'	Evergreen	8'
Koelreuteria bipinnata	Chinese Flame-Tree, Bougainvillea Goldenrain Tree		Deciduous	6'
Koelreuteria panniculata	Goldenrain Tree	'Fastigiata'	Deciduous	6'
Magnolia grandiflora	Southern Magnolia	'Bracken' s Brown Beauty,' 'D.D. Blanchard,' 'Greenback,' 'Hasse,' 'Little Gem,' 'Majestic Beauty,' 'Phyllis Barrow,' 'Plantation,' 'Russet,' 'Samuel Sommer,' 'Select III,'	Evergreen	12'
Nyssa sylvatica	Blackgum, Black Tupelo, Sourgum,		Deciduous	8'
Ostrya virginiana	Eastern Hophornbeam, American Hophornbeam		Deciduous	4'
Oxydendrum arboretum	Sourwood, Sorrel-Tree		Deciduous	8'
Pistacia chinensis	Chinese Pistache		Deciduous	6'
Quercus acutissima	Sawtooth Oak		Deciduous	6'
Quercus rubra	Northern Red Oak		Deciduous	8' →

Trees 25-50' tall. General selection criteria: USDA hardiness zone 7 (N Ala - N Tenn); typically single-trunk (unless specified otherwise); branches & trunk of larger species resistant to breakage; surface rooting generally not a problem; no thorns; minimal problems with messiness; little invasive potential.

LATIN NAME	COMMON NAME	NOTABLE VARIETIES, COMMENTS	LEAF SHED	MIN PLTG SPACE WIDTH
Tilia cordata	Littleleaf Linden	'Greenspire,' 'June Bride,' 'Rancho,'	Deciduous	8'

Large Trees 50' tall and larger. **General selection criteria:** USDA hardiness zone 7 (N Ala - N Tenn); typically single-trunk (unless specified otherwise); branches & trunk of larger species resistant to breakage; surface rooting generally not a problem; no thorns; minimal problems with messiness; little invasive potential

LATIN NAME	COMMON NAME	NOTABLE VARIETIES, COMMENTS	LEAF SHED	MIN PLTG SPACE WIDTH
Acer saccharum	Sugar Maple	'Commemoration,' 'Green Mountain,'	Deciduous	8'
Liriodendron tulipifera	Tuliptree, Tulip-Poplar, Yellow-Poplar		Deciduous	8'
Magnolia acuminata	Cucumbertree, Cucumber Magnolia	'Variegata,'	Deciduous	8'
Magnolia grandiflora	Southern Magnolia		Evergreen	12'
Metasequoia glyptostroboides	Dawn Redwood		Deciduous	12'
Quercus alba	White Oak		Deciduous	8'
Quercus falcata	Southern Red Oak, Spanish Oak		Deciduous	8'
Quercus michauxii	Swamp Chestnut Oak		Deciduous	8'
Quercus muehlenbergii	Chinkapin Oak		Deciduous	8'
Quercus phellos	Willow Oak		Deciduous	8'
Quercus prinus	Chestnut Oak		Deciduous	8'
Quercus shumardii	Shumard Oak		Deciduous	8'
Taxodium distichum	Baldcypress	'Monarch of Illinois,' 'Pendens,'	Deciduous	6' →

Large Trees 50' tall and larger. **General selection criteria:** USDA hardiness zone 7 (N Ala - N Tenn); typically single-trunk (unless specified otherwise); branches & trunk of larger species resistant to breakage; surface rooting generally not a problem; no thorns; minimal problems with messiness; little invasive potential

LATIN NAME	COMMON NAME	NOTABLE VARIETIES, COMMENTS	LEAF SHED	MIN PLTG SPACE WIDTH
Tilia cordata	Littleleaf Linden	'Glenleven,'	Deciduous	8'
Ulmus parvifolia	[true] Chinese Elm, Lacebark Elm	'Allee,' 'Drake,' 'Dynasty,' 'Sempervirens.' A "survivor" tree for medium-to-large areas.	Deciduous	8'

SPECIES UNACCEPTABLE FOR PLANTING ON PUBLIC LANDS [1]

COMMON NAME	BOTANICAL NAME	PROBLEM CODES *
LARGE TREES		
Boxelder	*Acer negundo*	G,H,R,W
Silver maple	*Acer saccharinum*	G,H,R,W
Tree-of-Heaven	*Ailanthus altissima*	G,W
Catalpa	*Catalpa bignonioides*	(C)I,M,
Sycamore	*Platanus occidentalis*	(C)D
Cottonwood	*Populus species*	M,R,W
Colorado blue spruce	*Picea pungens*	S
Red spruce	*Picea rubens*	S
Live oak	*Quercus virginiana*	S
Laurel oak	*Quercus laurifolia*	S
MEDIUM TREES		
Camphor	*Cinnamomum camphora*	S
Cutleaf European Birch	*Betula pendula*	D,S
Silktree ("mimosa")	*Albizia julibrissin*	D,M
Chinaberry	*Melia azederach*	G,W
Yellowwood	*Cladrastis lutea*	G,W
Mulberry, red & white	*Morus* species	G,M,R,W
Princesstree (or Royal Paulownia)	*Paulownia tomentosa*	G,M,W
Slash pine	*Pinus elliottii*	S,W
Eastern white pine	*Pinus strobus*	D,I,S
Pin oak	*Quercus palustris*	(C)D,S
Willows	*Salix* species	G,R
Sassafras	*Sassafras albidum*	(C)G,R
Siberian elm	*Ulmus pumila*	D,G,H,I,
SMALL TREES		
Sumac species	*Rhus* species	(C)G,H,W
Goldenrain tree	*Koelreutaria paniculata*	(C)S,W
Pear, flowering (Bradford, etc.)	*Pyrus calleryana*	(C)G,H

*** PROBLEM CODES:**

(C) Conditionally acceptable
F Excessive disease problems
G Excessive growth rate, causing weak wood, excessive maintenance load, etc.)
H Undesirable growth habit (weak crotches, etc.)
I Excessive insect problems
M Messy (flowers, seeds, leaves, fruit, etc.)
R Aggressive roots, causing sidewalk heaving, invasion of sewer lines and drain fields, etc.
S Site incompatibility (not cold hardy, not adapted to local soils, etc.)
W Undesirable wood properties (weakness, tendency to break during winds, susceptibility to decay, etc.)
X Special problems (poisonous parts, thorns, unusually susceptible to vandalism, etc.)

[1] Developed by Chuck Weber over the period of his tenure as City Forester of Huntsville, AL, from 1985 through 2005.

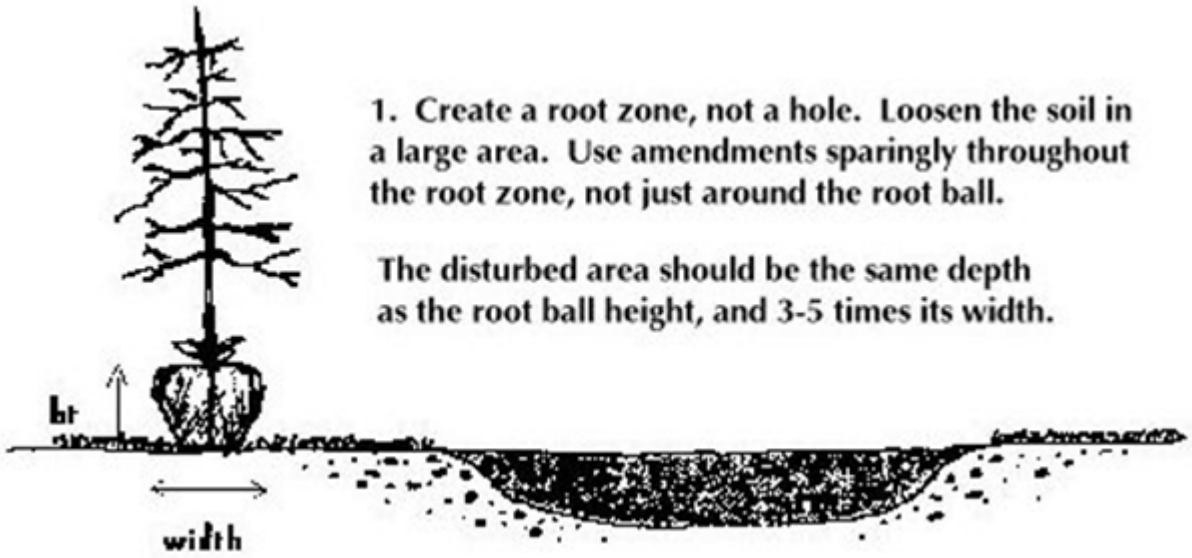
Planting techniques. Lasting planting success depends on two broad principles, in addition to other design considerations specific to an individual site. First is adequate soil volume to accommodate the root system of the plants that grow there.

A rule of thumb developed by landscape architect Jim Urban, of Annapolis, MD, is that on the average a tree needs about 60 cubic feet of usable soil per inch of its *mature* trunk diameter. Circular areas 18" deep, with this amount of soil, would have approximately the diameters shown below:

Mature Tree Diameter	Diameter of circular root area 18" deep
12"	25 ft.
18"	30 ft.
24"	35 ft.
30"	39 ft.
36"	43 ft.
42"	46 ft.
48"	49 ft.

A number of trees and other plants could share this area. The diameter would be considerably larger for soils with less usable depth.

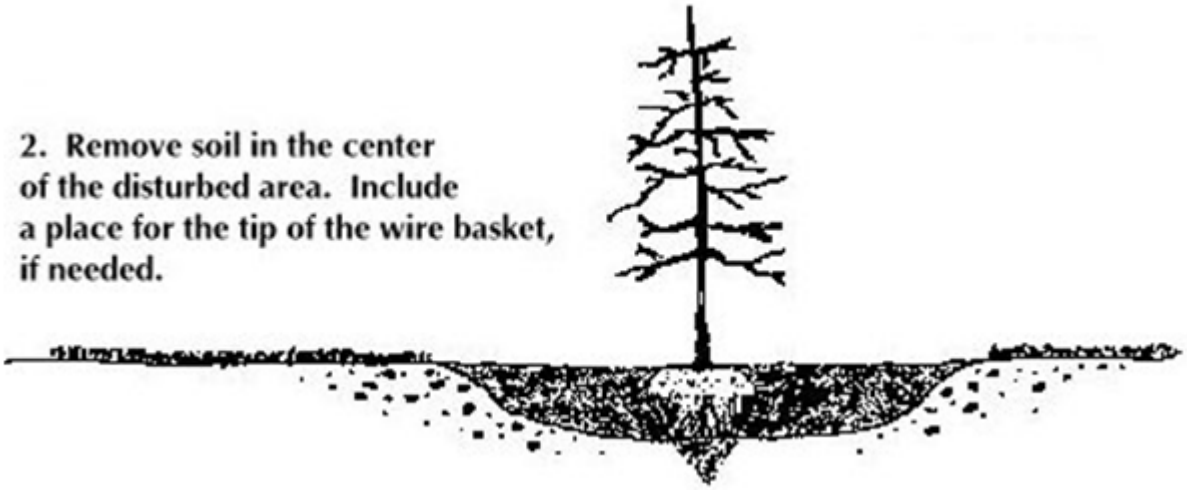
The other overriding principle has to do with planting technique. The objective is to get a newly-planted tree to become established as quickly as possible, with its roots into the surrounding soil. Several precautions should be observed, which are summarized in the following sketches:[2]



Cont'd

[2] By Chuck Weber.

2. Remove soil in the center of the disturbed area. Include a place for the tip of the wire basket, if needed.



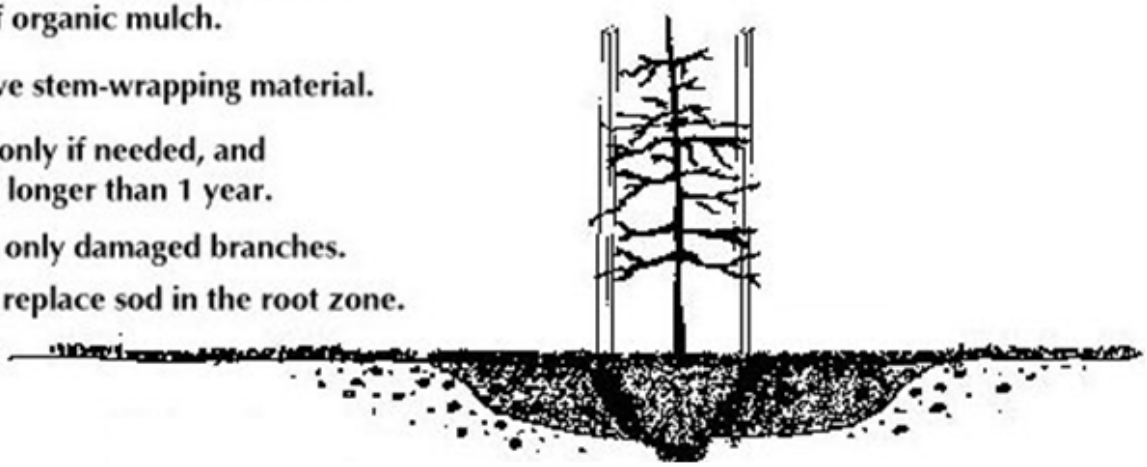
3. Backfill, water well, and add 2-3: of organic mulch.

Remove stem-wrapping material.

Stake only if needed, and for no longer than 1 year.

Prune only damaged branches.

Don't replace sod in the root zone.



10/17/2010 **Tree Inspection Data Summary, by Tree Number** - p.1 Chuck Weber 256-536-1397

Tree #	Species	Diam (4.5')	Stems	Condition approx %	Existing problems. Maintenance needs if trees are to be retained. Other comments.
1	MAPLE - RED	2.8	1	60	3 ft from curb. Form & structure fair; basal mower dmg; some top dieback.
	Ft to old curb 3 Ft to new curb 3 Disposition: Rmv (xplt?)				Probably not suitable for transplanting, exc possibly with tree spade.
2	ASH - GREEN	31	2	30	2' from curb. Serious internal decay in main trunk & several branches. Branch & top dieback. Several included-bark forks
	Ft to old curb 2 Ft to new curb 3 Disposition: REMOVE				DO NOT RETAIN UNDER ANY CIRCUMSTANCES.
3	MAPLE - SUGAR	29.5	2	60	3' from curb. In asphalt pavement. 1 main included-bark fork (IBF). Top half of crown flat-sided (Util), producing deadwood & sunscald.
	Ft to old curb 3 Ft to new curb 0 Disposition: REMOVE				Prune out deadwood, monitor IBF
4	MAPLE - SUGAR (lg)				Several IBFs, and fairly serious decay low in crown.
	Ft to old curb Ft to new curb Disposition: Inspect; prune or remove.				Needs aerial inspection to determine maint needs if tree is to remain. On deck over pavement in Main St Cafe courtyard. Is this a City-owned tree? Who is responsible for maintenance?
5	MAGNOLIA - SOUTHERN	4, 4.5	2	60	9.75' from curb. Basal fork - will become IBF, causing growth & safety problems. Utility conflict (elec).
	Ft to old curb 9.75 Ft to new curb 2 Disposition: Rmv (xplt?)				If transplanted, remove one stem; minor pruning in remaining crown. Dedicated to WC Gillespie.

Tree #	Species / Diam (4.5') / Stems / Condition approx %	Existing problems. Maintenance needs if trees are to be retained. Other comments.
6	MAPLE - SUGAR 21.5 2/1 50 Ft to old curb 17.5 Ft to new curb 9 Disposition: REMOVE (IBFs)	17.5' from curb. Major IBF 6' up; bad 3-way fork ~1/2-way up. Top half of crown flat-sided (util), producing deadwood & sunscald.
7	MAPLE - SUGAR 25.5 2 40 Ft to old curb 17.5 Ft to new curb 8 Disposition: REMOVE (IBFs)	17.5' from curb. Major IBF ~5' up.
8	MAPLE - SUGAR 16 1 50 Ft to old curb 17.5 Ft to new curb 6 Disposition: Keep?	17.5' from curb. Questionable fork ~14' up. Flat-sided (Util). Minor deadwood. Growth somewhat suppressed. Minor pruning. Check integrity of IBF.
9	MAPLE - SUGAR 25.5 3 / 1 40 Ft to old curb 17.25 Ft to new curb 6 Disposition: REMOVE (IBFs)	17.25' from curb. Major IBFs ~8', 12', & 40' up. Other minor U-forks. Several significant injuries on trunk.
10	MAPLE - SUGAR 18.75 1 80 Ft to old curb 17.25 Ft to new curb 5 Disposition: Keep?	17.25' from curb. Somewhat flat-sided (Util). Minor deadwood. Minor pruning Just east of boxwoods. Pruning scars show some good branch cuts (outside collar), but also some flush-cuts that have caused decay where branches were attached (see photos for trees 14 & 15).

10/17/2010 **Tree Inspection Data Summary, by Tree Number** - p.3 Chuck Weber 256-536-1397

Tree #	Species / Diam (4.5') / Stems / Condition approx %	Existing problems. Maintenance needs if trees are to be retained. Other comments.
11	MAPLE - SUGAR 18 / 2 / 1 / 30 Ft to old curb 16.5 Ft to new curb 4 Disposition: REMOVE	16.5' from curb. Trunk leans to east, but no sign that root plate is unstable. Extensive internal decay ~4 -15' up. U-fork ~25' up. Between bench & boxwoods. REMOVE.
12	MAPLE - SUGAR 18.5 / 1 / 50 Ft to old curb 16.5 Ft to new curb 4 Disposition: Keep?	16.5' from curb. Crown flat-sided (Util). Minor deadwood.
13	MAPLE - SUGAR 25.5 / 2 / 1 / 40 Ft to old curb 16.5 Ft to new curb 9 Disposition: In Greenspace. REMOVE	16.5' from curb. IBFs ~8', 20', 30', and 35' up. Minor deadwood (Replace photos)
14	MAPLE - SUGAR 20 / 1 / 30 Ft to old curb 16.5 Ft to new curb 3 Disposition: Keep?	16.5' from curb. IBF ~6' up. Hanger (detached branch). Deadwood in top. 2 U-forks ~30' up. Crown flat-sided (Util). North of R/R crossing sign. Note internal decay from past flush-cuts during pruning.
15	MAPLE - SUGAR 20 / 1 / 30 Ft to old curb 16.5 Ft to new curb 1 Disposition: REMOVE (1' from new	16.5' from curb. U-fork ~30' up. Crown flat-sided (Util), causing sunscald. Decay from pruning flush-cuts on W, N, & S sides of trunk.

Tree #	Species / Diam (4.5') / Stems / Condition approx %	Existing problems. Maintenance needs if trees are to be retained. Other comments.
16	MAPLE - SUGAR 20.5 1 30 Ft to old curb 16.5 Ft to new curb 0 Disposition: REMOVE (0' from new	16.5' from curb. Basal damage. Several U-forks in lower stem. Crown flat-sided (Util.); flush-cuts leading to stem decay.
17	MAPLE - SUGAR 26.5 3 / 1 30 Ft to old curb 16 Ft to new curb 0 Disposition: REMOVE (0' from new	16' from crown. Major IBF ~4' up. Multi-IBF ~30' up. Crown flat-sided(Util). Minor deadwood
18	MAPLE - SUGAR 17 1 30 Ft to old curb 15.75 Ft to new curb 0 Disposition: REMOVE (0' from new	15.75' from curb. U-fork ~ 30' up - one side dead; sunscald in other side. Minor deadwood. Prune out deadwood. Note decay from past pruning flush-cuts.
19	REDCEDAR - EASTERN 15 1 80 Ft to old curb 16.25 Ft to new curb Disposition: In Greenspace. Keep.	16.25' from curb. Pruning stubs & minor deadwood. Crown moderately flat-sided (Util). Prune deadwood & stubs; PROTECT during construction, if retained. Save, if possible
20	HOLLY - FOSTER 4, 4 2 50 Ft to old curb 16.5 Ft to new curb 0 Disposition: REMOVE (0' from new	16.5' from curb. Basal wound & IBF. Could be retained or transplanted, but probably not worth the expense and effort.

Tree #	Species	Diam (4.5')	Stems	Condition approx %	Existing problems. Maintenance needs if trees are to be retained. Other comments.
21	HOLLY - FOSTER	6	1	20	23' from curb. Similar to #20, but worse. Basal & stem wounds.
	Ft to old curb	23			
	Ft to new curb	0			
	Disposition: REMOVE (0' from new				Could be retained or transplanted, but probably not worth the expense and effort. REMOVE.
22	PECAN	16, 16	2	60	~23' from curb. IBF at base. Minor deadwood.
	Ft to old curb	23			Cables? Minor pruning. CAUTION: rock or iron bar embedded in basal fork.
	Ft to new curb				
	Disposition: In Greenspace. Keep &				(REPLACE PHOTO). Aside from the IBF, this is a pretty good tree. 2-3 cables, if installed and maintained properly, might make it serviceable, provided the tree is adequately protected during construction.
23	OAK - WILLOW	52.5	3 / 1	40	Overhangs curb. Extensive basal damage on 3 sides. One U-fork over street. Low branch over parking space. Trunk decay on S & W sides, from 2' upward. Deadwood over adjacent buildings. Deadwood & dieback in top of crown.
	Ft to old curb	0			Inspect with lift truck to make decision about pruning or removal.
	Ft to new curb				
	Disposition: In Greenspace. REMOVE				The largest tree on the street, but potentially the most dangerous.
24	MAPLE - SUGAR	27.5	3	20	2' from curb. Major IBFs on E and W sides, one with serious existing split. Much deadwood and dieback.
	Ft to old curb	2			
	Ft to new curb				
	Disposition: In Greenspace. REMOVE				Document current condition with additional photos, then REMOVE without delay.
25	MAPLE - SUGAR	33	4 / 1	40	3.5' from curb. Multiple IBFs ~8' up. Some internal decay. Some major leaders over street and parking spaces, with decay from pruning flush-cuts. Minor deadwood.
	Ft to old curb	3.5			
	Ft to new curb				
	Disposition: In Greenspace. REMOVE				See comments in Report about planting on this side of the street.

Tree #	Species / Diam (4.5') / Stems / Condition approx %	Existing problems. Maintenance needs if trees are to be retained. Other comments.
26	ASH - GREEN 3, 3, 2 — 3 — 30 Ft to old curb 5 Ft to new curb 0 Disposition: Remove - do not xplt	5' from curb. Major IBF ~24' up. Pruning stubs, crossed/rubbing branches. Don't save (because of IBF). See comments in Report about planting on this side of the street.
27	ASH - GREEN 2, 2 — 2 — 40 Ft to old curb 5 Ft to new curb 0 Disposition: Remove - do not xplt	5' from curb. U-fork ~3' up. Under elec service (which may be moved during construction). Thin crown if retained. See comments in Report about planting on this side of the street.
28	ASH - GREEN - — - — - Ft to old curb 0 Ft to new curb 0 Disposition: (gone)	Has been removed. See comments in Report about planting on this side of the street.
29	ASH - GREEN 1 — 1 — 80 Ft to old curb 5 Ft to new curb 0 Disposition: Remove - prune & xplt	5' from curb. Basal suckers. Pruning stubs, future problem branches. Raise crown to 6' (for now) and higher later. Transplant for use elsewhere? See comments in Report about planting on this side of the street.
30	BEECH - EUROPEAN 12 — 1 — 90 Ft to old curb 5 Ft to new curb 0 Disposition: Xplt if possible (0' from	5' from curb. Crossed/rubbing branches. Minor deadwood. Prune out problem branches. Sidewalk clearance pruning. PROTECT during construction, if retained. See comments in Report about planting on this side of the street.

Tree #	Species / Diam (4.5') / Stems / Condition approx %	Existing problems. Maintenance needs if trees are to be retained. Other comments.
31	BEECH - EUROPEAN 13 1 90 Ft to old curb 5 Ft to new curb 0 Disposition: Xplt if possible (0' from	5' from curb. Crossed/rubbing branches. Minor deadwood. Prune out problem branches. Sidewalk clearance pruning. PROTECT during construction, if retained. See comments in Report about planting on this side of the street.
32	BEECH - EUROPEAN 10.5 3 / 1 80 Ft to old curb 5 Ft to new curb 0 Disposition: Xplt if possible (0' from	5' from curb. Major U-fork in lower crown; all bark visible & no decay; should be OK. Minor deadwood. Prune out problem branches. Sidewalk clearance pruning. PROTECT during construction, if retained. See comments in Report about planting on this side of the street.
33	REDCEDAR - EASTERN 20.5 1 80 Ft to old curb 3.75 Ft to new curb Disposition: In Greenspace. Keep.	3.75' from curb. 2 U-forks (OK). Minor deadwood, some over street. Prune out deadwood. PROTECT during construction, if retained. See comments in Report about planting on this side of the street.

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Chuck Weber 256-536-1397

Tree #	Species	Diam (4.5')	Stems	Condition approx %	Ft to old curb	Ft to new curb	Disposition Recomm.
1	MAPLE - RED	2.8	1	60	3	3	Rmv (xplt?)
2	ASH - GREEN	31	2	30	2	3	REMOVE
3	MAPLE - SUGAR	29.5	2	60	3	0	REMOVE
4	MAPLE - SUGAR	(lg)					Inspect; prune or remove.
5	MAGNOLIA - SOUTHERN	4, 4.5	2	60	9.75	2	Rmv (xplt?)
6	MAPLE - SUGAR	21.5	2/1	50	17.5	9	REMOVE (IBFs)
7	MAPLE - SUGAR	25.5	2	40	17.5	8	REMOVE (IBFs)
8	MAPLE - SUGAR	16	1	50	17.5	6	Keep?
9	MAPLE - SUGAR	25.5	3 / 1	40	17.25	6	REMOVE (IBFs)
10	MAPLE - SUGAR	18.75	1	80	17.25	5	Keep?
11	MAPLE - SUGAR	18	2 / 1	30	16.5	4	REMOVE
12	MAPLE - SUGAR	18.5	1	50	16.5	4	Keep?
13	MAPLE - SUGAR	25.5	2 / 1	40	16.5	9	In Greenspace. REMOVE (IBFs)
14	MAPLE - SUGAR	20	1	30	16.5	3	Keep?
15	MAPLE - SUGAR	20	1	30	16.5	1	REMOVE (1' from new curb)
16	MAPLE - SUGAR	20.5	1	30	16.5	0	REMOVE (0' from new curb)
17	MAPLE - SUGAR	26.5	3 / 1	30	16	0	REMOVE (0' from new curb)
18	MAPLE - SUGAR	17	1	30	15.75	0	REMOVE (0' from new curb)
19	REDCEDAR - EASTERN	15	1	80	16.25		In Greenspace. Keep.
20	HOLLY - FOSTER	4, 4	2	50	16.5	0	REMOVE (0' from new curb)
21	HOLLY - FOSTER	6	1	20	23	0	REMOVE (0' from new curb)
22	PECAN	16, 16	2	60	23		In Greenspace. Keep & cable IBF?
23	OAK - WILLOW	52.5	3 / 1	40	0		In Greenspace. REMOVE (IBFs)
24	MAPLE - SUGAR	27.5	3	20	2		In Greenspace. REMOVE (IBFs)
25	MAPLE - SUGAR	33	4 / 1	40	3.5		In Greenspace. REMOVE (IBFs)?
26	ASH - GREEN	3, 3, 2	3	30	5	0	Remove - do not xplt (IBF)

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Tree Inspection Data Summary - p. 2

Chuck Weber 256-536-1397

Tree #	Species	Diam (4.5')	Stems	Condition approx %	Ft to old curb	Ft to new curb	Disposition Recomm.
27	ASH - GREEN	2, 2	2	40	5	0	Remove - do not xplt
28	ASH - GREEN	-	-	-	0	0	(gone)
29	ASH - GREEN	1	1	80	5	0	Remove - prune & xplt
30	BEECH - EUROPEAN	12	1	90	5	0	Xplt if possible (0' from new curb)
31	BEECH - EUROPEAN	13	1	90	5	0	Xplt if possible (0' from new curb)
32	BEECH - EUROPEAN	10.5	3 / 1	80	5	0	Xplt if possible (0' from new curb)
33	REDCEDAR - EASTERN	20.5	1	80	3.75		In Greenspace. Keep.